

# SPECIFICATION

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## [Simplified Antenna Structures for Logging Tools]

### Cross Reference to Related Applications

This application is a continuation-in-part of U.S. Patent Application Serial No. 10/113,686, filed March 29, 2002, <sup>now U.S. Patent No 6,690,170</sup>

### Background of Invention

[0001] Field of the Invention

[0002] The invention relates generally to electromagnetic well logging apparatus. More specifically, antenna structures for such well logging apparatus.

[0003] Background Art

[0004] Electromagnetic (EM) based instruments for measuring properties of matter or identifying its composition are well known. The nuclear magnetic resonance (NMR) technique has been used to form images of biological tissues or to determine the composition of, for example, earth formations. The values of electrical conductivity biological samples or for earth formations have been obtained through the use of electromagnetic induction tools. EM propagation well logging devices are also well known, and are used for measuring basic parameters such as amplitude and phase shift of EM waves being propagated through a medium in order to determine specific properties of the medium.

[0005]

Electrical conductivity (or its inverse, resistivity) is an important property of subsurface formations in geological surveys and prospecting for oil, gas, and water because many minerals, and more particularly hydrocarbons, are less conductive than common sedimentary rocks. Thus a measure of the conductivity is often a guide to